

# Photoelectric sensors

06.03.2020 / Version 2.0

## Fiber Optic Amplifier OF10



**Baumer**


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## Additional Features

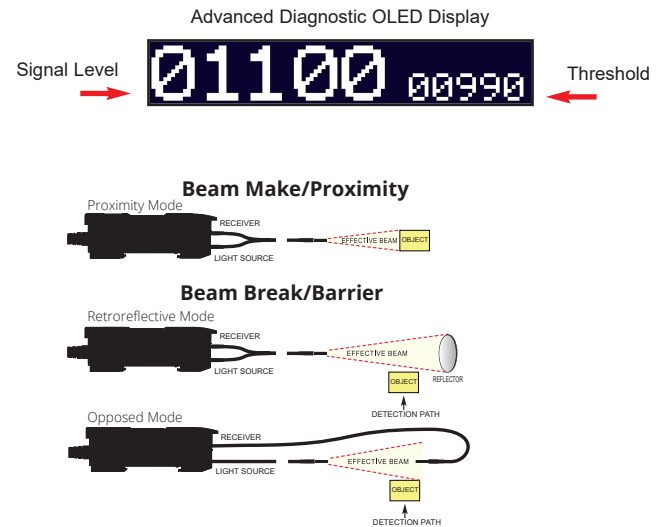
- Intuitive OLED display
- Advanced remote programming
- Six **AUTOSET** modes
- Crosstalk rejection between two sensors without a wire
- Programmable input configurations
- High-speed, high-resolution, and long-range modes
- Combinable time filter, with latching and reset capability

## Quick Start

This Sensor is adjusted by a single push of a button;  
The sensor default settings\* (Light State) will work for most applications.  
Follow the three step procedure below:

1. Establish one of the following conditions:  
**Beam Make/Proximity** - Reflect light off object.  
**Beam Break/Barrier** - Remove object from light beam path.
2. Tap **AUTOSET** (●) button:  
 Pressing the AUTOSET button sets the sensors threshold to the desired level.
3. Verify setup on advanced diagnostic OLED display. If needed, the threshold can be altered by tapping up or down on the threshold adjust rocker.

\* Note: Consult all default settings on page 6.



## Features

### WIDE VARIETY OF FIBERS

Visit [www.baumer.com](http://www.baumer.com) for full listing.

### AUTOSET (●)

Push to perform AUTOSET.

### THRESHOLD/VALUE ADJUST ROCKER (▼▲)

1. Manually adjusts the threshold.
2. Alters programming parameters.  
Hold to scroll for numeric values.

### MODE (■)

1. Tap to display sensor status screen.
2. Tap again to access parameters.

### CONNECTION

4-Pin M8 connector or built-in cable.

### FIBER RELEASE CLAMP

Locks fibers in place.

### OUTPUT LEDS

1. Illuminates solid when output is ON.
2. Flashes when output is overloaded.

### ADVANCED DIAGNOSTIC OLED DISPLAY

See next page for complete listing.

### INPUT FUNCTION LIGHT RING

Illuminates when input is activated.

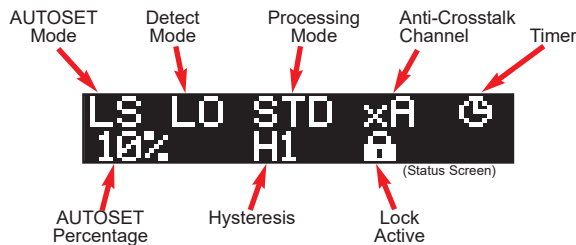
Note: Only available on connector models.

# Programming



The response time, AUTOSET function, output configuration, and other features can be tailored to your unique application. Follow the programming procedure contained in this section.

- Tap **MODE** (■) to show status screen. Status Screen shows a quick overview of sensor's settings.



Note: Programming will time out after 60 seconds if no action is taken.  
Tap and hold **MODE** (■) to exit status screen.

- Tap **MODE** (■) again to access first parameter. Continue tapping to select desired parameter. Use the threshold/value **ADJUST ROCKER** (▼▲) to select or adjust a specific parameter.

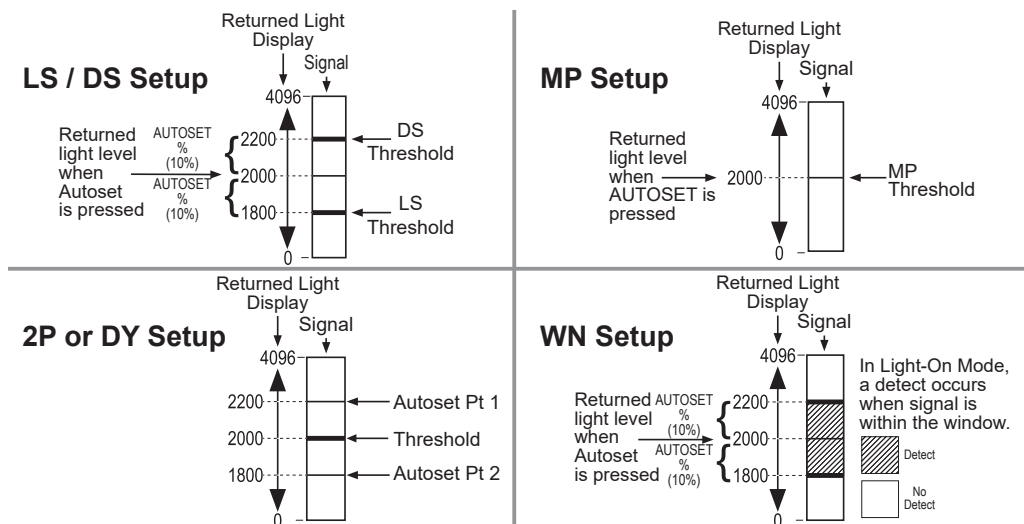


## AUTOSET Modes

The sensor's automatic threshold adjustment is controlled by the AUTOSET mode. Each AUTOSET mode sets the threshold differently. Select the mode that works best for your specific application. See details at the left.



AUTOSET Mode: Light State LS	<b>Light-State (LS):</b> Sets threshold below received light beam intensity.
AUTOSET Mode: Dark State DS	<b>Dark-State (DS):</b> Sets threshold above received light beam intensity.
AUTOSET Mode: Midpoint MP	<b>Midpoint (MP):</b> Sets threshold at received light beam intensity.
AUTOSET Mode: Two-Point 2P	<b>Two-point (2P):</b> Sets threshold between received light beam intensity two point.
AUTOSET Mode: Dynamic DY	<b>Dynamic (DY):</b> Sets threshold between received light beam high and low intensity.
AUTOSET Mode: Window WN	<b>Window (WN):</b> Sets two thresholds equally spaced above and below received light beam intensity. Received light beam intensity within the window is a valid detect. Outside the window is not a valid detect.



## AUTOSET Percent

For Light State (LS), Dark State (DS), and Window AUTOSET Modes (WN), the offset percentage is adjustable. AUTOSET Percent determines threshold placement during AUTOSET. Placement is a percentage of received light beam intensity.

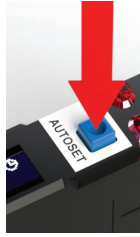
ADJUST 1% - 50% (Hold to scroll)



AUTOSET Pct: 10%

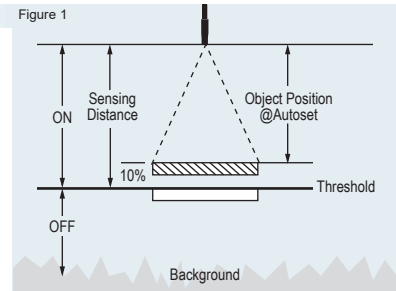
# Using AUTOSET

The threshold is set automatically by pressing the AUTOSET button. There are six different ways the sensor determines the threshold. The user first must determine which type of setup mode is appropriate for the application. The simplest and most common mode we recommend is Light State (LS) setup. It is used in both beam make and beam break sensing. When using this mode, the sensor will provide the best sensitivity to fine changes in light level or contrast. After a performed AUTOSET, the threshold can be manually altered by tapping up or down on the threshold adjust rocker. Note: OLED display will provide intuitive visual feedback during autosetting.



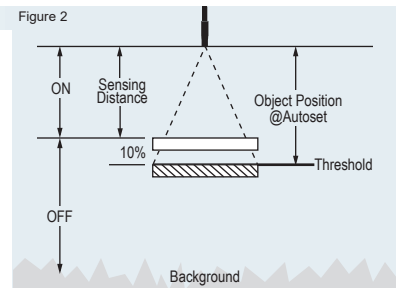
## Light State (Default)

Place object to be detected in the worst-case light-state condition and press the AUTOSET button. The threshold will be set 10%(default) below the received light-beam intensity. The threshold can be altered by tapping up or down on the threshold adjust rocker (see Figure 1).



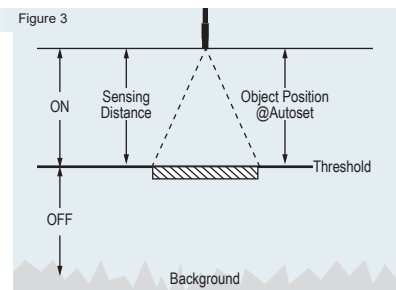
## Dark State

Place object to be detected in the worst-case dark-state condition and press the AUTOSET button. The threshold will be set 10%(default) above the received light-beam intensity. The threshold can be altered by tapping up or down on the threshold adjust rocker (see Figure 2).



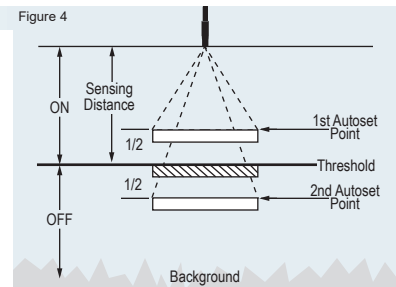
## Midpoint

Place object to be detected in position at which you want the threshold to be set and press the AUTOSET button. The threshold can be altered by tapping up or down on the threshold adjust rocker (see Figure 3).



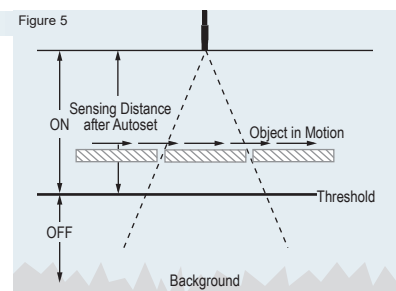
## Two-Point

Place object to be detected in the light-state condition and press the AUTOSET button. Then remove or place the object in the dark-state condition and press the AUTOSET button again. The threshold will be set between the two light-beam intensities. The threshold can be altered by tapping up or down on the threshold adjust rocker (see Figure 4).



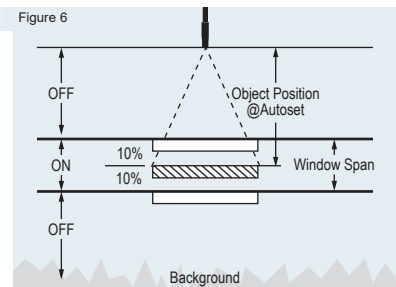
## Dynamic

Press the AUTOSET button to start the Dynamic AUTOSET. Now move the object through the beam at least once and press the AUTOSET button again to complete the Dynamic AUTOSET. The threshold is set between the highest and lowest received light levels caused by the object being passed through. The threshold can be altered by tapping up or down on the threshold adjust rocker (see Figure 5).



## Window

Window mode is a unique type of AUTOSET mode. Window mode creates two thresholds and can be used in a similar manner as a dual channel fiberoptic sensor. Place the object in the position at which you want to be reliably detect it and press the AUTOSET button. The sensor will place two thresholds 10%(default) higher and 10%(default) lower than the returned light level. Now when the object is passed in view or through the fiberoptic the object will be detected in the same position +/- 10%. The 10% threshold window span can be altered by tapping up or down on the threshold adjust rocker (see Figure 6).



## Detect Mode

Sensor output activates or deactivates when received light intensity is over the threshold. *Not available when input function is set to Remote Dark On.*

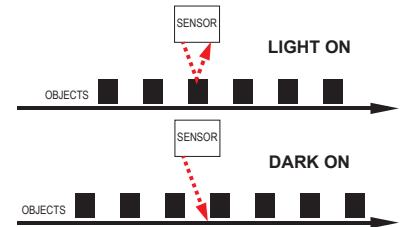


Detect Mode:  
Light On LO

Detect Mode:  
Dark On DO

**Light On (LO):** Output activates when received light intensity is over the threshold. *Note: In window mode (WN) output activates when received light intensity is inside the window thresholds.*

**Dark On (DO):** Output deactivates when received light intensity is over the threshold. *Note: In window mode (WN) output activates when received light intensity is outside the window thresholds.*



## Response Time

Select which mode that best fits the performance need of your application. Sensor speed, range, and sensitivity are optimized for best performance.



Response Time:  
Ultra-High-Speed

Response Time:  
High-Speed

Response Time:  
Standard

Response Time:  
High-Resolution

Response Time:  
Long-Range

Response Time:  
Ultra-Long-Range

**Ultra-High-Speed (UHS):** Fastest response time (50us). *Not available in Asynchronous Anti-Crosstalk Mode.*

**High-Speed (HS):** Fast response time with higher sensitivity (125us). *Not available in Asynchronous Anti-Crosstalk Mode.*

**Standard (STD):** Good balance of response time and range for general purpose sensing (250us).

**High-Resolution (HR):** Improved resolution for general purpose sensing (1ms).

**Long-Range (LR):** General purpose sensing with improved range (4ms).

**Ultra-Long-Range (ULR):** Special purpose sensing with maximum sensitivity and range (16ms).



## Hysteresis

To avoid false triggers for example due to object vibration. Adjusts the span between the operate point and the release point of the sensor output. Low hysteresis increases sensitivity and high hysteresis increases sensing stability.



Hysteresis:  
Low H0

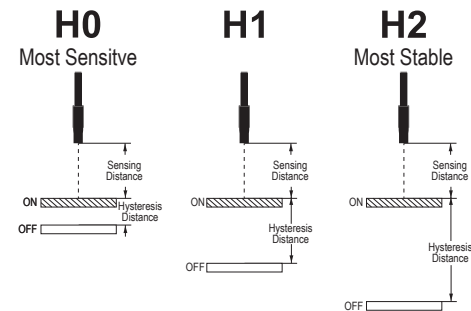
Hysteresis:  
Standard H1

Hysteresis:  
High H2

**Low (H0):** Reduced hysteresis for increased sensitivity.

**Standard (H1):** Automatic adjustment depending on signal level.

**High (H2):** Increased hysteresis for increased stability.



## Anti-Crosstalk

Turns on Asynchronous Anti-Crosstalk rejection for two sensors. *Note: Channels 1 and 2 cannot be set as Channels A and B; anti-crosstalk is for use of two separate sensors. Not available for UHS and HS modes.*



Anti-Crosstalk:  
Disabled

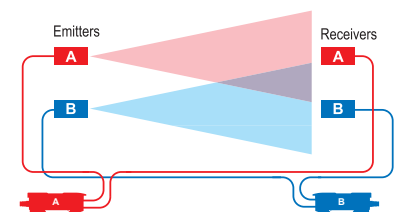
Async Crosstalk:  
Channel A xA

Async Crosstalk:  
Channel B xB

**Disabled:** Turns off Anti-Crosstalk rejection.

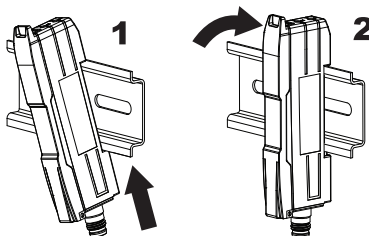
Assign one sensor to channel A and the other to channel B.

## Asynchronous Crosstalk



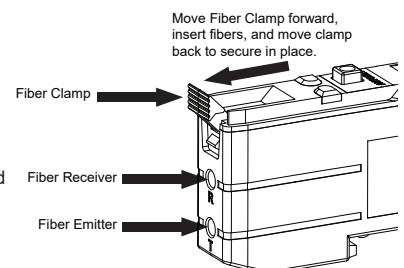
## Mounting on a DIN Rail

1. Hook the DIN rail clip on the bottom of the sensor under the edge of the DIN rail.
2. Gently push and pivot the sensor onto the DIN rail, pressing until it snaps into place.



## Installing the Fibers

1. Open the dust cover.
2. Move the fiber clamp forward to unlock it.
3. Insert the fiber(s) into the fiber port(s) until they stop.
4. Move the fiber clamp backward to secure the fiber(s).
5. Close the dust cover.



PRESS

**Timer/Counter Function #:**

Choose from 19 pre-configured timer/counter control functions. Each one represents a function such as on-delay, off-delay, etc. Once a function is selected, adjustable parameters of that function appear such as delay time.

ADJUST

**Timer Duration**

On Delay:  
10ms

**0.1 - 9.9, 10 - 9999ms**

Hold up or down to scroll.

ADJUST

**Counter**

Count:  
0005

**0001-9999**

Hold up or down to scroll.

Select

**00**

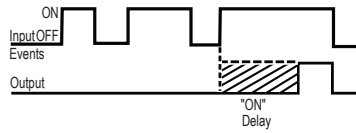
Timer Func: 00  
Bypass

Timer not used.

**01**

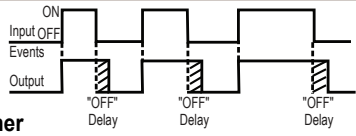
Timer Func: 01  
On-Delay

"ON" Delay

**02**

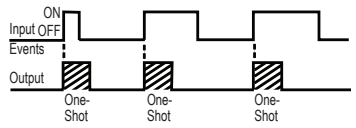
Timer Func: 02  
Off-Delay

"OFF" Delay Pulse Stretcher

**03**

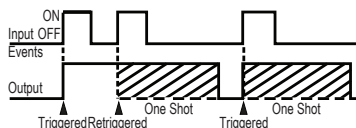
Timer Func: 03  
One-Shot

One-Shot

**04**

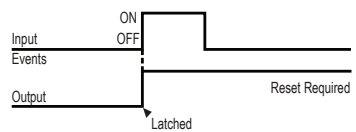
Timer Func: 04  
Motion

Motion Detection

**05**

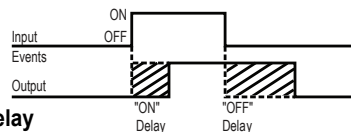
Timer Func: 05  
Latch

Latching, Edge Triggered

**06**

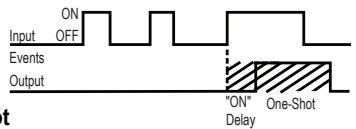
Timer Func: 06  
On, Off-Delay

"ON" Delay then "OFF" Delay

**07**

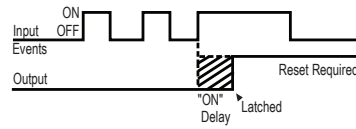
Timer Func: 07  
On, One-Shot

"ON" Delay, then One-Shot

**08**

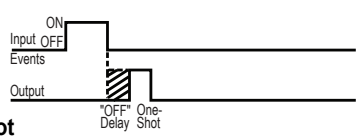
Timer Func: 08  
On, Latch

"ON" Delay then Latch

**09**

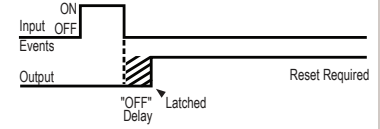
Timer Func: 09  
Off, One-Shot

"OFF" Delay then One-Shot

**10**

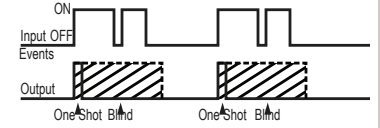
Timer Func: 10  
Off, Latch

"OFF" Delay then Latch

**11**

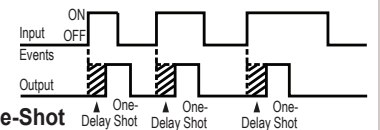
Timer Func: 11  
Blind One-Shot

Blind One-Shot

**12**

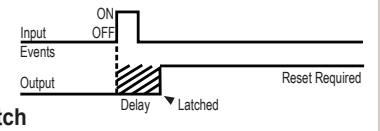
Timer Func: 12  
Delayed One-Shot

One-Shot Delay, then One-Shot

**13**

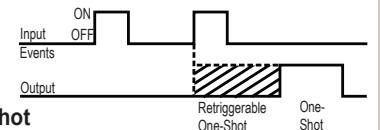
Timer Func: 13  
Delayed Latch

One-Shot Delay, then Latch

**14**

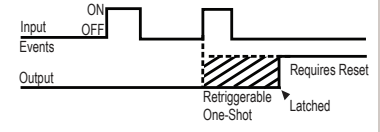
Timer Func: 14  
Stop, One-Shot

Stop Motion, then One-Shot

**15**

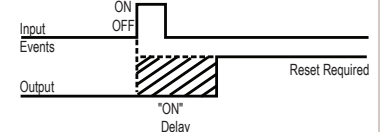
Timer Func: 15  
Stop, Latch

Stop Motion, then Latch

**16**

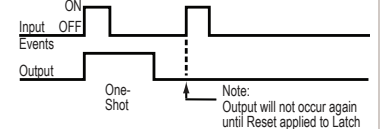
Timer Func: 16  
Latch, On-Delay

Latch then "ON" Delay

**17**

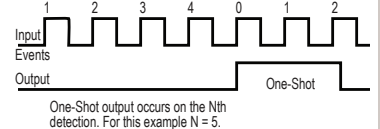
Timer Func: 17  
Latch, One-Shot

Latch, then One-Shot

**18**

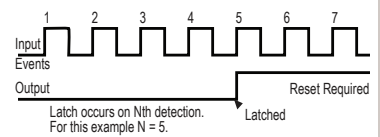
Timer Func: 18  
Count, One-Shot

Count, One-Shot

**19**

Timer Func: 00  
Count, Latch

Count, Latch



## Input Functions

Select input to be performed:



- Input Function: Disabled
- Input Function: Remote Set
- Input Function: Remote Command
- Input Function: Interrogate
- Input Function: Gate
- Input Function: Remote Dark On
- Input Function: Remote Lockout

**Disabled:** To ignore unwanted signals.

**Remote set:** An AUTOSET function is performed when input wire is transitioned from idle to active and returned. *Note: input wire can be used in addition to the AUTOSET button.*

**Remote command:** Sensor parameters can be adjusted via defined pulses. See chart on page 7.

**Interrogate:** Sensor output is latched when input wire is transitioned from idle to active.

**Gate:** Sensing is gated. Detection is enabled when input is active.

**Remote Dark On:** Detect Mode is determined by input state. Dark On mode is used when input is active.

**Remote Lockout:** Remote lock of the AUTOSET, up and down adjust and most mode functions.

## Display Mode

Selects between numeric and percentage modes and flips orientation.



- Display Mode: Numeric
- Display Mode: Percentage
- Display Mode: Numeric
- Display Mode: Percentage

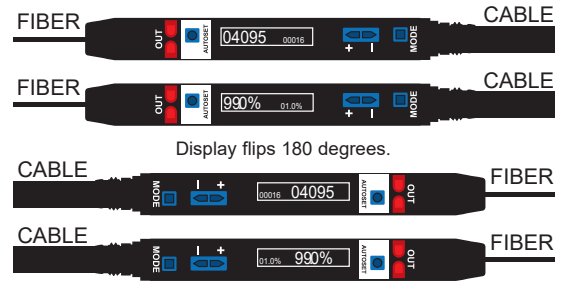
Display flips 180 degrees.

04095 00016

99.9% 01.0%

00016 04095

01.0% 99.9%



## Lock Mode

Locks buttons. *Note: Input wire remains unlocked.*



- Button Lock: Disabled
- Button Lock: Enabled

**Disabled:** Adjustments made by anyone.

**Enabled:** Prevents unauthorized tampering. To unlock, tap MODE to scroll through menu to Button Lock and select Disabled to unlock.

Sensor Locked

Displayed when sensor is locked.

## Default Setting Chart

PARAMETER	Default	
AUTOSET MODE	Light-State	Other options: Dark-State, Midpoint Two-point, Dynamic, Window
AUTOSET PERCENT	10%	Other options: 1% - 50%
DETECT MODE	Light On	Other option: Dark On
RESPONSE TIME	Standard	Other options: Ultra-High-Speed, High-Speed, High-Resolution, Long-Range, Ultra-Long-Range
HYSTERESIS	Standard	Other options: Low, High
ANTI-CROSSTALK	Disabled	Other options: Asynchronous Channel A, Asynchronous Channel B
TIMER	Bypass	Other options: Timer 1-19
TIMER DURATION	10ms	Other options: 0001 - 9999ms
INPUT FUNCTIONS	Disabled	Other options: Remote Set, Remote Command, Interrogate, Gate, Remote Dark On, Remote Lockout
DISPLAY MODE	Numeric	Other options: Percentage, Numeric Flipped, Percentage Flipped
LOCK MODE	Disabled	Other option: Enabled

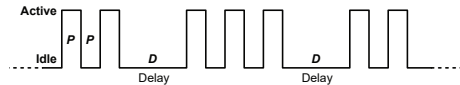
## Factory Reset

Hold down MODE (■) on power up, then tap up or down (▲▼).  
Sensor will return to all settings to factory default (see chart above).

## Remote Command Programming

In Remote Command Mode a limited set of options can be configured via the input wire. This is accomplished by sending a simple sequence of pulses on Q2 (white wire). For example, sending a sequence of two pulses followed by three pulse followed by two pulses selects dark on mode.

### Example of 2 - 3 - 3 pulse command



Pulse width (P) is 40ms - 400ms.  
The delay between sets of pulses (D) is 0.75 - 5 seconds.

Pulses are displayed while being received. Valid commands are executed immediately. Holding the input active will cancel a partial command.

### AUTOSET

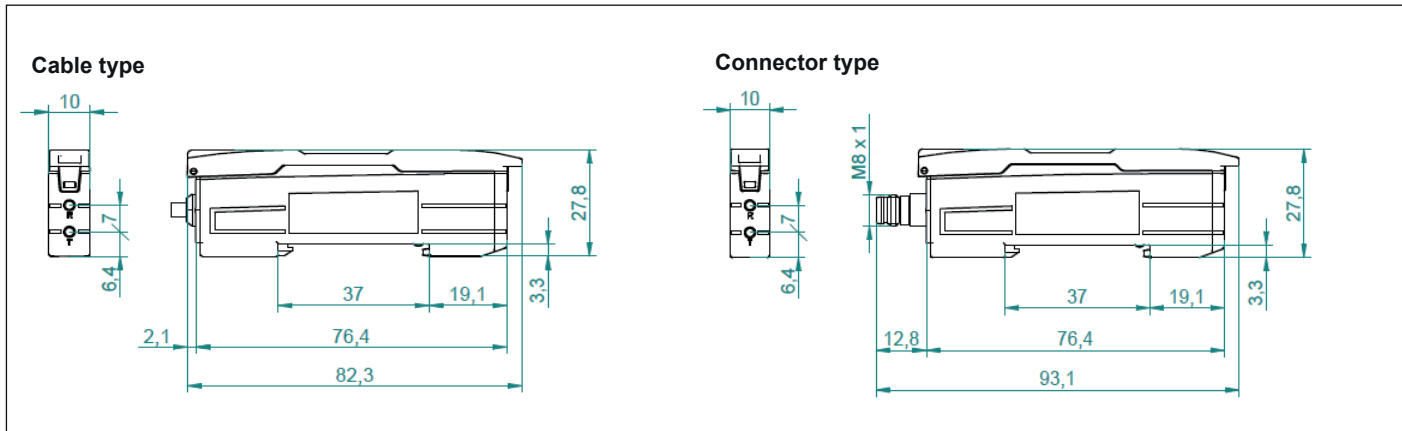
A single pulse command initiates an AUTOSET. A second single pulse command is required to complete Two-Point and Dynamic AUTOSETs.

Setting	Option	Icon	Pulse Sequence	Notes
AUTOSET			1	A single pulse initiates AUTOSET. An additional pulse command is required to complete AUTOSET for two-point and dynamic modes.
AUTOSET Mode	Light-State	LS	2 - 1 - 1	
	Dark-State	DS	2 - 1 - 2	
	Midpoint	MP	2 - 1 - 3	
	Two-Point	2P	2 - 1 - 4	
	Dynamic Set	DY	2 - 1 - 5	
	Window	WN	2 - 1 - 6	
AUTOSET Percent	1%	01%	2 - 2 - 1	Percentage will affect the next Light, Dark AUTOSET.
	2%	02%	2 - 2 - 2	Immediate effect on Window Size
	5%	05%	2 - 2 - 3	
	10%	10%	2 - 2 - 4	
	20%	20%	2 - 2 - 5	
	50%	50%	2 - 2 - 6	
Detect Mode	Light On	LO	2 - 3 - 1	
	Dark On	DO	2 - 3 - 2	
Response Time	Ultra-High-Speed	UHS	2 - 4 - 1	Anti-Crosstalk Disabled
	High-Speed	HS	2 - 4 - 2	Anti-Crosstalk Disabled
	Standard	STD	2 - 4 - 3	
	High Resolution	HR	2 - 4 - 4	
	Long-Range	LR	2 - 4 - 5	
	Ultra-Long-Range	ULR	2 - 4 - 6	
Hysteresis	Low	H0	2 - 5 - 1	
	Standard	H1	2 - 5 - 2	
	High	H2	2 - 5 - 3	
Anti-Crosstalk	Disabled		2 - 6 - 1	
	Async-Channel A	xA	2 - 6 - 2	
	Async-Channel B	xB	2 - 6 - 3	
Timer Function	Bypass		3 - 1 - 1	
	On-Delay	🕒	3 - 1 - 2	
	Off-Delay	🕒	3 - 1 - 3	
	One-Shot	🕒	3 - 1 - 4	
	Motion	🕒	3 - 1 - 5	
	On, Off-Delay	🕒	3 - 1 - 6	
	On, One-Shot	🕒	3 - 1 - 7	
	Off, One-Shot	🕒	3 - 1 - 8	
	Blind One-Shot	🕒	3 - 1 - 9	
	Delayed One-Shot	🕒	3 - 1 - 10	
	Stop, One-Shot	🕒	3 - 1 - 11	
Timer 1 Duration	1ms		3 - 2 - 1	
	2ms		3 - 2 - 2	
	5ms		3 - 2 - 3	
	10ms		3 - 2 - 4	
	20ms		3 - 2 - 5	
	50ms		3 - 2 - 6	
Timer 2 Duration	1ms		3 - 3 - 1	
	2ms		3 - 3 - 2	
	5ms		3 - 3 - 3	
	10ms		3 - 3 - 4	
	20ms		3 - 3 - 5	
	50ms		3 - 3 - 6	
Button Lock	Disabled		4 - 1 - 1	
	Enabled	🔒	4 - 1 - 2	
Display Mode	Numeric		4 - 2 - 1	
	Percentage		4 - 2 - 2	
	Numeric (Flipped)		4 - 2 - 3	
	Percentage (Flipped)		4 - 2 - 4	



# Specifications

## dimension drawing



### general data

actual range Sb (FSE 200C1002)	840 mm (16 ms)
sensing distance Tw (FUE 200C1003)	210 mm (16 ms)
light source	pulsed red LED
light indicator	OLED display
output indicator	LED red
adjustment	teach-in by button, by wire
wave length	660 nm
suppression of reciprocal influence	yes

### electrical data

response time / release time	0,05 ... 16 ms (adjustable)
voltage supply range +Vs	8 ... 30 VDC
current consumption max. (no load)	50 mA @ 8 VDC
current consumption typ. (no load)	30 mA @ 24 VDC
voltage drop Vd	< 2 VDC
output function	light / dark operating
on / off delay	0,1 ... 9'999 ms
output circuit	PNP or NPN
output current	< 150 mA
short circuit protection	yes
reverse polarity protection	yes

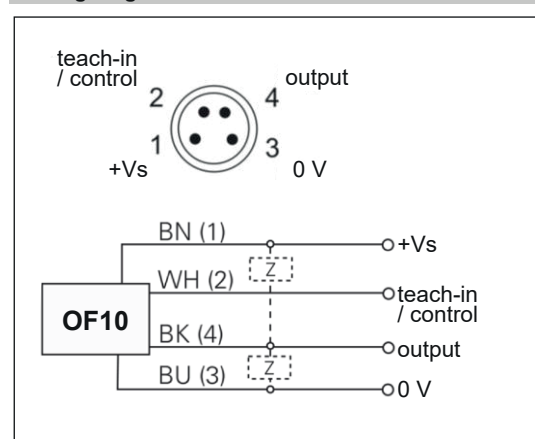
### mechanical data

width / diameter	10 mm
height / length	27,8 mm
depth	93,1
type	rectangular
housing material	polycarbonate
connection type	connector M8 4 pin or cable 2m

### ambient conditions

operating temperature	+5...+55°C
protection class	IP 50

### wiring diagram



- Disconnect power before connecting the sensor.
- Voltage supply according UL 1310, Class 2 or device shall be protected by an external R/C or list fuse, rated max. 30 VAC/3A or 24 VDC/4A